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```
clear
close all
% clc

time_horizon = 50;
time_const = 1/2*time_horizon;
init_heading = pi/10;
sampling_time = 0.1;
box_halflength = 4;
omega = pi/time_horizon/sampling_time;
turning_rate = omega*ones(time_horizon,1);
dist_cov = 0.001;
probability_threshold_of_interest = 0.8;
no_of_direction_vectors_ccc = 16;
v_nominal = 10;
umax = v_nominal/3*2;
```

LTV system definition

```
[sys, heading_vec] = getDubinsCarLtv('add-dist', ...
turning_rate, ...
init_heading, ...
sampling_time, ...
Polyhedron('lb',0,'ub',umax), ...
eye(2), ...
RandomVector('Gaussian',zeros(2,1), dist_cov * eye(2)));

target_tube_cell = cell(time_horizon + 1,1);
```

Target tube definition

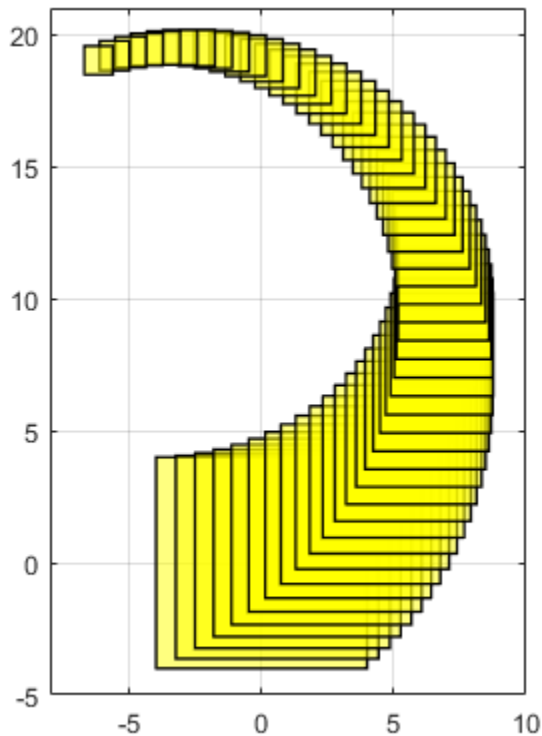
```
figure(100);clf;hold on
angle_at_the_center = (heading_vec) - pi/2;
center_box = zeros(2, time_horizon + 1);
for itt = 0:time_horizon
    center_box(:, itt+1) = v_nominal * [cos(angle_at_the_center(itt
+1))-cos(angle_at_the_center(1));
                                         sin(angle_at_the_center(itt
+1))-sin(angle_at_the_center(1))];
```

```

        target_tube_cell{itt+1} = Polyhedron('lb',center_box(:, itt+1) -
        box_halflength * exp(- itt/time_const), 'ub', center_box(:, itt+1) +
        box_halflength*exp(- itt/time_const));
        plot(target_tube_cell{itt+1},'alpha',0.5,'color','y');
    end
    axis equal
    axis([-8    10    -5    21]);
    box on;
    grid on;

    target_tube = Tube(target_tube_cell{:});

```



Set of direction vectors

```

theta_vector_ccc = linspace(0, 2*pi, no_of_direction_vectors_ccc+1);
theta_vector_ccc = theta_vector_ccc(1:end-1);
set_of_direction_vectors_ccc = [cos(theta_vector_ccc);
                               sin(theta_vector_ccc)];

```

Set computation

```

timer_polytope_ccc = tic;
opts = SReachSetOptions('term', 'chance-open', 'pwa_accuracy',
    1e-3, ...
    'set_of_dir_vecs', set_of_direction_vectors_ccc, ...

```

```

        'init_safe_set_affine', Polyhedron(), 'verbose', 0);
[ccc_polytope, extra_info] = SReachSet('term', 'chance-open', sys, 0.8,
    target_tube, opts);
elapsed_time_polytope_ccc = toc(timer_polytope_ccc);
fprintf('Time taken for computing the polytope (CCC): %1.3f s\n',
    elapsed_time_polytope_ccc);

```

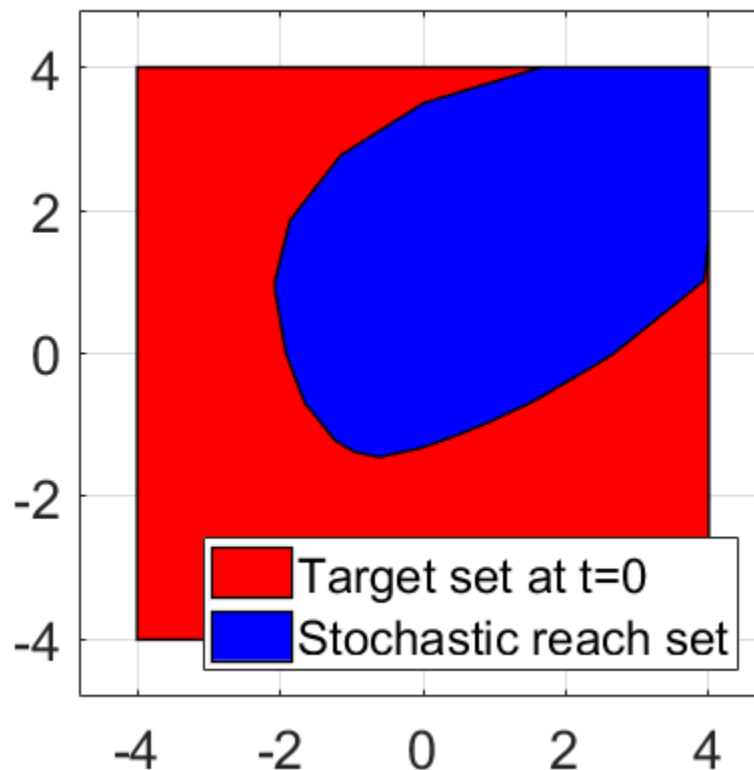
Time taken for computing the polytope (CCC): 39.805 s

Plot the set

```

figure(101);
clf;
hold on;
plot(target_tube(1));
%
plot(underapproximate_stochastic_reach_avoid_polytope_ccc, 'color', 'm');
plot(ccc_polytope, 'color', 'b');
axis equal
axis (1.2*[-box_halflength box_halflength -box_halflength
    box_halflength]);
box on;
legend('Target set at t=0', 'Stochastic reach
    set', 'Location', 'SouthEast');
set(gca, 'FontSize', 20);

```



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